DISCONTINUOUS CONJUNCTION OF NOMINAL MODIFIERS

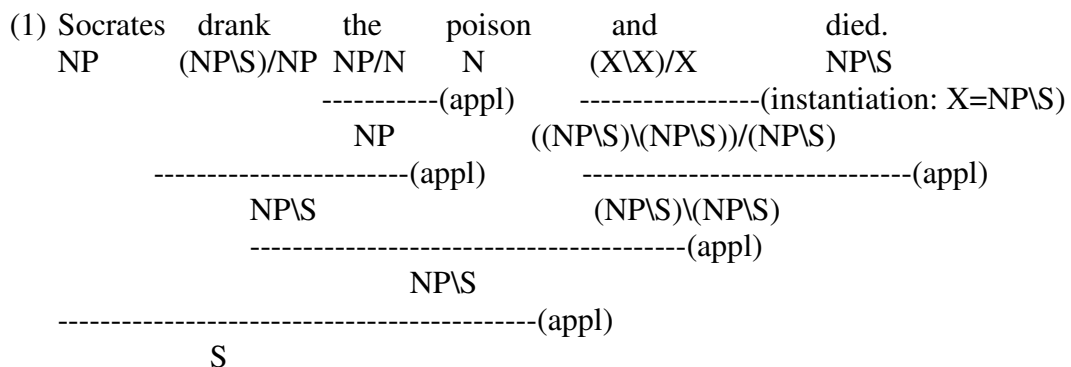Jack Hoeksema, University of Groningen

1. INTRODUCTION

There are (at least) two competing views on the basic parallelism requirements that are standardly imposed in the area of conjunction:

- conjuncts must have identical categories, based on internal constituency
- conjuncts must have identical categories, based on distributional properties.

The former view is that of X-bar grammar and its various predecessors and descendants, and has been around at least since Chomsky (1957), and also forms an important part of the account of conjunction in such frameworks as Generalized Phrase Structure Grammar (Gazdar 1981, Gazdar, Klein, Pullum and Sag 1985) and Head-driven Phrase Structure Grammar (Pollard and Sag 1994). In particular, what makes two phrases identical in category is the category of the head. The latter view is enshrined in the categorial grammar tradition (cf. e.g. Steedman 1985, 1990, 2000, Zwarts 1986, Dowty 1988, 1997). Here what matters is not internal structure, but combinatorics: X and Y are identical if they combine with the same elements to form categories with identical combinatory possibilities.[1]
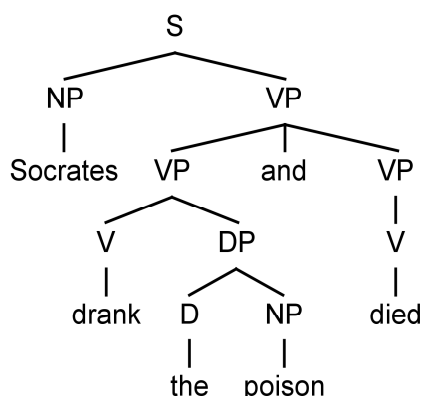
A typical categorial approach to conjunction is illustrated in (1) below, a typical X-bar, or Phrase Structure treatment is to be found in (2). The category of *and* in (1) is a schematic category, in which the variable X may be replaced by any category symbol.[2] The abbreviation *appl* stands for application, or function application. In some approaches to categorial grammar, application is a primitive operation, in others, such as the Lambek calculus (Lambek 1958), it is derivable.

```
(1) Socrates   drank     the      poison        and              died.
    NP         (NP\S)/NP NP/N     N             (X\X)/X          NP\S
                         -----------(appl)       ----------------(instantiation: X=NP\S)
                              NP              ((NP\S)\(NP\S))/(NP\S)
              -----------------------(appl)        -----------------------------(appl)
                   NP\S                             (NP\S)\(NP\S)
                   ------------------------------------------(appl)
                              NP\S
    -------------------------------------------(appl)
                   S
```

(2) Socrates drank the poison and died.

```
                        S
              ┌─────────┴─────────┐
             NP                   VP
              |          ┌────────┼────────┐
          Socrates      VP      and        VP
                     ┌───┴───┐              |
                     V       DP             V
                     |      ┌─┴─┐           |
                   drank    D   NP        died
                            |    |
                           the  poison
```

Although the two types of accounts mentioned above make largely the same predictions, they nonetheless differ on some crucial points. Consider the coördination of adverbial phrases such as:

(3) Jones kicked the ball hard and with passion.
(4) Smith left in the middle of the night and alone.

Given their internal structure, *hard* and *with passion* in example (1) would have to count as an AP and a PP, respectively. In example (2), *in the middle of the night* would be a PP, and *alone* is an AP (but see Hoeksema and Napoli 2008 for some PP-like characteristics of this adjective). The X-bar account is difficult to reconcile with the acceptability of the examples in (1) and (2). A categorial account, on the other hand, is rather straightforward: given independent evidence that *hard* and *with passion* are adverbial phrases (they both combine independently of another directly with verb phrases), their category is VP/VP (ignoring for the moment the issue of directionality). That is, they belong to the category of functors that take a VP argument and yield a VP.

Within an X-bar approach, the two adverbial phrases could be made equal by adding some invisible functional element, let's call it F, turning them into FPs. However, this kind of solution would bring these expression into the fold at the cost of making the theory that conjuncts have equal categories, and that these categories are determined by internal make-up, virtually irrefutable

Another approach to the above examples might employ some kind of ellipsis. In that case, we could treat them as cases of sentential conjunction, with subsequent deletion of repeated material, like so:

(5) Jones kicked the ball hard and ~~Jones kicked the ball~~ with passion.

A well-known problem with conjunction reduction of this kind is that it tends to make wrong predictions when quantifiers are involved (cf. e.g. Zwarts 1986 for discussion). For example, (6a) and its source under the conjunction reduction analysis, (6b), are not semantically equivalent:

(6) a. Jones kicked a ball hard and with passion.
   b. Jones kicked a ball hard and Jones kicked a ball with passion.

It would seem then, given these considerations, that the categorial treatment of coordination has some initial plausibility.[3]

2. AN ODD TYPE OF CONJUNCTION

I will now present some interesting new evidence for the categorial perspective, from a type of coordination involving prenominal adjectival phrases and postnominal PPs and relative clauses in older stages of Dutch.

(7) De Heer Bodisco was een **zeer beschaafde** man, en **op wiens oordeel, in verschillende betrekkingen, groote prijs gesteld werd**.[4]
   "Mr Bodisco was a very civilized man, and whose judgment, in various matters, was highly esteemed."
(8) Het was eene **seer lange** brief, en **die door alle drie die heeren nog al een wijle wierde bestudeert.**[5]
   "It was a very long letter, and which was studied by those three gentlemen for quite a while"
(9) Een **treffelicke** lesse, en **die oock onze Heeren Staten tot onder-richtinghe gestreckt heeft**[6]
   "An excellent lesson, and which has served to edify our Gentlemen of Parliament as well"
(10) het is een treurig ambacht, en dat slechts dient om aan modegrillen te voldoen[7]
   "It is a sad trade, and which only serves to cater to the whims of fashion"

In categorial terms, both conjuncts, though internally quite divers, are similar because they are adnominal modifiers of the general category NP/NP (ignoring, once more, the issue of directionality).

---

[3] Jan-Wouter Zwart (p.c.) has suggested that we might be able to save the conjunction reduction approach by assuming that we do not delete a copy of the quantifier, but rather a pronoun bound by the quantifier. In this way, we derive *Jones kicked a ball hard and with passion* from *Jones kicked a ball hard and Jones kicked it with passion*. If we assume that a binding relation is sufficient for deletion, and that identity is not strictly required, we might indeed be able to deal with this type of example. However, the approach still falters when we consider other quantifiers. E.g.: *Jones kicked no ball hard and with passion* cannot be derived from *??Jones kicked no ball hard and Jones kicked it with* passion (cf. Kamp and Reyle 1993 for a general account of what is possible and what is not in the area of anaphoric relationships between quantifiers and pronouns). Deriving it from *Jones kicked no ball hard and Jones kicked no ball with passion* may now seem possible, but note that such a derivation leads to problems with disjunction: *Jones kicked no ball hard or with passion* is not equivalent to *Jones kicked no ball hard or Jones kicked no ball with passion* (cf. Lakoff 1970, Zwarts 1986 for further discussion).
[4] Example from: Willem van den Hull, *Autobiografie (1778-1854),* Verloren, Hilversum, 1996, p. 72.
[5] Example from: *Gedenkschriften van Gijsbert Jan van Hardenbroek (1747-1787),* dl I, ed. F.J.L. Krämer, Johannes Müller, Amsterdam, 1901, p 170.
[6] Example from: Johan de Brune (de Oude), *Emblemata of Zinne-werck.* Ian Evertsen Kloppenburch, Amsterdam 1636.
[7] Example from: Jules Verne, *Onderzeesche reis om de aarde*, translation of *Vingt mille lieues sous les mers* by W.J.A. Huberts, Tjeenk Willink, Zwolle, 1871.

Although the above data are from an older stage of Dutch, and modern data of this type are hard to find, it seems that the factors involved in this examples are still at work in the current language. Consider the following three sentences:

(11)　　We hadden een leuke vakantie en met erg mooi weer.
　　　　We had　　a　nice　vacation and with very fine weather

(12)　　We hadden een leuke vakantie met erg mooi weer.
　　　　We had　　a　nice　vacation with very fine weather

(13)　　We hadden een vakantie en met erg mooi weer.
　　　　We had　　a　vacation and with very fine weather

If asked to rank these sentences according to their syntactic acceptability, native speakers come up with the ranking 12>11>13, since they strongly prefer the middle sentence, which is impeccable, but then prefer the first one, involving a coordinated PP and a pronominal AP, to the last example, where there is no modifier, either pre- or postnominal, corresponding to the conjoined PP. My point here is, that while we may not find many examples like (11) in current Dutch anymore, such sentences are still preferred to more starkly ungrammatical ones like (13).

Similar examples can be made with relative clauses instead of prepositional phrases:

(14)　Fred kocht een prachtig huis en dat nog goedkoop was ook.
　　　'Fred bought a beautiful house and which cheap was, too.'

(15)　Fred kocht een prachtig huis dat nog goedkoop was ook.
　　　'Fred bought a beautiful house which was cheap, as well'

(16)　Fred kocht een huis en dat goedkoop was.
　　　'Fred bought a house and which was cheap'

Again, the example with the adjective and the relative clause (14), has an intermediate status between (15), which is flawless and (16), which is downright bad.

On the basis of the small sample of naturally-occurring examples that I collected (14 cases), it is not possible to tell, with any semblance of accuracy, when the type of conjunction, exemplified by (7-10) above, became obsolete. However, all occurrences collected are relatively old-fashioned, and do not seem to be current. I have found no examples with disjunction or *noch* 'nor', although I do not think that such examples were impossible. However, it is a well-known fact that conjunction is far more common than disjunction, or negative disjunction with *nor*.[8] I did find, however, an example involving the adversative connective *maar* 'but':

---

[8] For example, the online website Wiktionary provides a list of word frequencies for a 29 million word corpus of TV and movie scripts (hence representing something close to spoken English), in which *and* occurs 480,214 times, *or* 55,062 times and *nor* a mere 553 times (reflecting its status as rather archaic and bookish). See http://en.wiktionary.org/wiki/Wiktionary:Frequency_lists#English.

(17) In zijn rug was Maurits met een klein leger, maar dat rijkelijk van
geschut voorzien was, in Brabant gevallen[9]
'In his rear Maurits, with a small army, but which was lavishly supplied
with artillery, had invaded Brabant'

For English, I do not have a large set of data, but it appears that older stages of English also permitted conjunction of pre- and postmodifiers:

(18) It was worth my observing, I thought, as ever any thing, to see how upon
these two scores, Sir G. Carteret, the most passionate man in the world, and
that was in greatest haste to be gone, did bear with it, and very pleasant all
the while[10]

I should note that I have not found any cases of adjectives conjoining with PPs, although I believe that these ought to be possible, given that adjectives conjoin with relative clauses, and that relative clauses conjoin with PPs, as (19) shows:

(19) eene meer dan bemiddelde weeze, van overouden naam, maar die dreigde
weg te kwijnen[11]
a more than wealthy orphan, of ancient name, but who was in danger of
pining away

Hence by transitivity of the conjoinability relation, APs should be conjoinable with PPs as well.

3. DISCONTINUOUS COÖRDINATION

Discontinuous coördination requires a mechanism for handling discontinuous constituents. In categorial grammar, movement is not available for this purpose, but a number of linguists have proposed some form of wrapping to model discontinuity (cf. Bach (1980, 1984), Hoeksema and Janda (1988), Dowty (1997), Morrill, Fadda and Valentín 2007, Whitman (2002, 2009), inter alia). The basic idea is that some complex functor ab combines with its argument c not by concatenation, yielding the string abc, but by wrapping around it, yielding acb. In modern minimalist generative grammar, the same effect can be had by merge-and-move.

It is not my purpose here to present a fully-developed calculus for wrapping and concatenation in a categorial model (the reader is referred to Dowty 1997, and Morrill, Fadda and Valentín 2007 for some proposals), but let me simply illustrate the main idea:

(20) Wrapping: Let $a_i b$ be a string of category A/B, and c be a string of
category B, then abc is a string of category A.
(Note: the subscript i on a indicates the position where the argument is
to be inserted.)

---

[9] Example from: Robert Fruin, *Tien jaren uit de Tachtigjarige Oorlog*, De Bataafsche Leeuw, Dieren, 1984 [1st edition 1861], p. 69.
[10] Example from the Diary of Samuel Pepys, entry for Monday 31 July 1665.
[11] Example from: E.J. Potgieter, *De zusters*, in *Proza 1837-1845*, H.D. Tjeenk Willink, Haarlem 1908, p. 144.

One weakness in the categorial literature on wrapping is that it does not usually adress the question of what determines the choice between concatenation and wrapping. It is clear that concatenation is the default choice, and that wrapping is a marked option, often chosen for special reasons. One such reason is the adjacency requirement for direct objects in English. Both English and Dutch have complex predicates such as *consider likely / waarschijnlijk achten* (cf. Bach 1980, Jacobson 1987, Hoeksema 1991, Neeleman 1994, Kang 1995), but only English requires that direct object directly follow the main verb. Together with other differences between the two languages (Dutch is largely SOV, English is SVO), this leads to wrapping in English and concatenation in Dutch:

(21)   that + I + consider likely + rain → that I consider rain likely (wrapping)
(22)   dat + ik + regen + waarschijnlijk acht → dat ik regen waarschijnlijk
        acht (concatenation)
        [NB: *dat* = dat, *ik* = I, *regen* = rain, *waarschijnlijk* = likely, *acht* =
        consider]

Another example of an adjacency constraint is found in nominal constructions. It is well-known that complex premodifiers are acceptable only if their head adjective is adjacent to the noun:

(23)   Jones is a difficult man.
(24)   Jones is a man difficult to please.
(25)   Jones is a difficult man to please.
(26)   ??Jones is a difficult to please man.[12]

Similar examples are presented in Flynn (1983: 54):

(27)   a brightly shining light
(28)   a light shining brightly
(29)   *a shining brightly light
(30)   a light brightly shining

In Dutch, we see a comparable constraint at work:

(31)   Jansen is tevreden met zijn salaris / met zijn salaris tevreden
        Jansen is content with his salary / with his salary content
        'Jansen is content with his salary
(32)   Jansen is een met zijn salaris tevreden werknemer
        Jansen is a   with his salary content   employee
        'Jansen is an employee content with his salary'
(33)   *Jansen is een tevreden met zijn salaris werknemer
        Jansen is a   content   with his salary employee

---

[12] Examples such as (22) are not completely impossible, given the possibility, in English, to make compound structures with phrasal nonheads: *under-the-counter sales, off-the-cuff remarks, easy-to-win race, out-of-the-box thinking* etc. However, such compounds should not be confused with regular phrases.

Note that in English, we see wrapping in (24) to meet the adjacency requirement. In Dutch, the AP may be either head final or head initial. This provides sufficient leeway to meet the adjacency requirement, and no wrapping is needed. The wrapped order is in fact dispreferred:

(34)   ??Jansen is een tevreden werknemer met zijn salaris.
         Jansen   is a   content employee with his salary

This brings us to the problem at hand. For semantic reasons, it is often useful to be able to coordinate modifiers. If these modifiers are either prenominal or postnominal, this should not lead to any problems. However, when, for syntactic reasons, some are prenominal (adjectives), and others postnominal (PPs, relative clauses), the result is bound to be syntactically problematic. The best way out of this mess is to use wrapping, since it permits the adjective to still precede the head noun, and the relative clause or PP to follow it.

4. AN OT SUPERSTRUCTURE

The need for some kind of mechanism which will prefer concatenation over wrapping, unless some other constraint requires wrapping, can be modeled straightforwardly in Optimality Theory (Prince and Smolensky 2004). Indeed, Optimality Theory was invented as a superstructure dealing with matters of choice, both in language production (classical OT) and interpretation (cf. Optimality Theoretic Semantics – Hendriks and de Hoop 2001, and bidirectional Optimality Theory – cf. Blutner 1999).

Let us assume that the preference of concatenation is expressed in terms of a markedness condition CONC(ATENATE), and the two adjacency conditions as surface filters: ADJ OBJ(ECT) and HFF (the latter named after Williams (1982) Head Final Filter). A general preference for prenominal APs over postnominal APs is enforced by a constraint PRENOM. Assuming that CONC and PRENOM are tied in the ranking of constraints, we get two optimal candidates, while ruling out one that is dispreferred:

Table 1: OT Tableau of adnominal modifiers

	HFF	CONC / PRENOM
difficult to please man	*	
✦difficult man to please		*
✦man difficult to please		*

Using stochastic OT (Boersma and Hayes 2001), we could alternatively model the clear preference for the second over the third candidate by letting CONC and PRENOM have overlapping ranks, such that CONC usually outranks PRENOM.[13]

---

[13] The ranking of CONC and PRENOM may well be lexically-sensitive, given the following pattern of judgments:
  (i)   Jim is a student keen on sports
  (ii)   *Jim is a keen student on sports
  (iii)   *Jim is a keen on sports student.
  (iv)   That is the same care as mine
  (v)   *That is the same as mine car
  (vi)   *That is the car same as mine

For the complex cases of conjunction reviewed before, we propose a similar treatment, but note that for light APs, the PRENOM condition is more important. We want to do justice to do this observation by ranking the PRENOM condition higher than we did before:

Table 2: OT tableau of adnominal conjunction (cf. example 17)

	HFF	PRENOM	CONC
a small but which was lavishly supplied army	*		
◆a small army but which was lavishly supplied			*
an army small but which was lavishly supplied		*	

Note that the OT superstructure is intended here merely to govern the choice of various output candidates provided by the lexicon and the combinatory rules. It does not play a role in the combinatorics directly, which can be handled by categorial grammar, or some other grammatical mechanism.[14] Rather, it serves to select, from among a plethora of options, the ones that speakers prefer.

5. CONCLUSIONS

We have seen evidence for discontinuous conjunction of prenominal adjectival phrases with (postnominal) relative clauses and prepositional phrases. I have argued that this kind of conjunction is evidence for a categorial treatment of coördination since it does not insist on similarities in internal structure for the two conjuncts, but requires similar combinatory properties. Added to this, I suggest an OT superstructure.

One important question, however, still remains. It appears that the type of conjunction under discussion is no longer in use. If this is indeed the case, the question becomes pertinent what the nature of this change is. Clearly, the answer cannot be that wrapping has disappeared, or that conjunction has somehow gone out of fashion. We might suppose instead that the change is due to constraint reranking in the OT component. Suppose we add an additional constraint, called DIR for 'directionality', which is violated by the conjunction of forward- and backward-looking functions. If this constraint is ranked low, it won't stand in the way of adjectives conjoining with relative clauses. If, on the other hand, it is ranked higher, it may serve to rule out such coördinations altogether. Suppose we add to the pool of admissible output candidates the case where there is no coordination of modifiers, but simply double modification, as an additional candidate. This candidate violates none of the above constraints, but fails to express conjunction overtly. If we state overtness of conjunction as another desideratum (the constraint OVERT), and rank it below DIR, we get the following result:

This suggests that for *keen on* CONC > PRENOM, while for *same as* the ranking is PRENOM > CONC. Other factors, such as definiteness, clearly also play a role, but will have to be ignored here.
[14] The categorial component plays the role of GEN (for GENERATOR) in the OT model.

Table 3

	HFF	PRENOM	DIR	OVERT	CONC
a small but which was lavishly supplied army	*		*		
a small army but which was lavishly supplied			*		*
an army small but which was lavishly supplied		*			
◆a small army which was lavishly supplied				*	

An additional advantage of this treatment is, that it not only rules out AP + Relative clause coordination, but at the same time makes correct predictions about the relative acceptability of the excluded cases. In particular, it predicts that the second candidate is still better than either the first or the third, a point confirmed informally but unanimously by the audience at an oral presentation of this material at the University of Groningen, June 2009. Predicting relative acceptability is very difficult to do without the use of violable constraints.

References

1.   Bach, Emmon. 1980. 'In defense of passive.' *Linguistics and Philosophy* 3, 297-341.
2.   Bach, Emmon. 1984. 'Some generalizations of categorial grammar.' In: Fred Landman and Frank Veltman, eds., *Varieties of Formal Semantics.* Foris, Dordrecht, 55-80.
3.   Bayer, Samuel, 1996. 'The Coordination of Unlike Categories.' *Language* 72-3, 579-616
4.   Blutner, Reinhard, 1999. 'Some aspects of optimality in natural language interpretation.' In: Helen de Hoop & Henriëtte de Swart (eds.) *Papers on Optimality Theoretic Semantics.* Utrecht Institute of Linguistics OTS, December 1999, 1-21.
5.   Boersma, Paul and Bruce Hayes. 2001. 'Empirical tests of the Gradual Learning Algorithm,' *Linguistic Inquiry* 32, 45-86.
6.   Chomsky, Noam. 1957, *Syntactic structures.* Mouton, The Hague.
7.   Dowty, David R. 1988. 'Type Raising, Functional Composition, and Non-constituent Conjunction.' In Oehrle et al., 153-197.
8.   Dowty, David R. 1997. 'Non-constituent coordination, wrapping, and multimodal categorial grammars.' In M.L. dalla Chiara, K. Doets, D. Mundici and J. van Benthem, eds., *Proceedings of the 1995 International Congress of Logic, Methodology, and Philosophy of Science, Florence.* Kluwer, Dordrecht, 347–368.
9.   Flynn, Michael. 1983. 'A categorial theory of structure building.' In: Gerald Gazdar, Ewan Klein and Geoffrey K. Pullum, eds., *Order, Concord and Constituency.* Foris, Dordrecht, 139-174.
10.   Gazdar, Gerald. 1981. 'Unbounded dependencies and coordinate structure.' *Linguistic Inquiry* 12, 155-184.
11.   Gazdar, Gerald, Ewan Klein, Geoffrey K. Pullum and Ivan A. Sag, 1985, *Generalized Phrase Structure Grammar.* Blackwell, Oxford.
12.   Hendriks, Petra and Helen de Hoop, 2001. 'Optimality Theoretic Semantics.' *Linguistics and Philosophy* 24:1, 1-32.
13.   Hoeksema, Jack, 1991. 'Complex Predicates and Liberation in Dutch and English,' *Linguistics and Philosophy* 14-4, 661-710.
14.   Hoeksema, Jack and Richard D. Janda. 1988. 'Implications of process-morphology for categorial grammar.' In: Oehrle et al., 199-247.
15.   Hoeksema, Jack and Donna Jo Napoli. 2008. 'Just for the hell of it: A comparison of two taboo-term constructions.' *Journal of Linguistics* 44, 347-378.
16.   Jacobson, Pauline, 1987, 'Phrase Structure, Grammatical Relations, and Discontinuous Constituents,' in G. Huck and A. Ojeda (eds.), *Syntax and Semantics 20: Discontinuous Constituency.* New York: Academic Press, 1987, 27-69.
17.   Kamp, Hans and Uwe Reyle, 1993. *From Discourse to Logic: Introduction to Modeltheoretic Semantics of Natural Language, Formal Logic and Discourse Representation Theory.* Dordrecht: Kluwer.
18.   Kang, Beom-Mo, 1995. 'On the treatment of complex predicates in categorial grammar.' *Linguistics and Philosophy* 18 (1), 61-81.
19.   Lambek, Joachim. 1958. 'The mathematics of sentence structure.' American Mathematical Monthly 65, 154-170.

20. Lambek, Joachim. 1961. 'On the calculus of syntactic types.' In: Roman Jakobson, ed., *Structure of Language and its Mathematical Aspects*. American Mathematical Society, Providence, 166-178.
21. Levy, Roger and Carl Pollard, 2002. 'Coordination and neutralization in HPSG.' In: Frank van Eynde, Lars Hellan and Dorothee Berman, eds., *Proceedings of the 8th International Conference on Head-Driven Phrase Structure Grammar*. Stanford: CSLI, 221-34.
22. Lakoff, George. 1970, 'Repartee, or a Reply to 'Negation, Conjunction and quantifiers'', *Foundations of Language* 6, 389-422.
23. Morrill, Glyn, Mario Fadda and Oriol Valentín. 2007, 'Nondeterministic Discontinuous Lambek Calculus,' in *Proceedings of the Seventh International Workshop on Computational Semantics*, IWCS7, Tilburg.
24. Neeleman, Ad. 1994. *Complex Predicates*. Dissertation, University of Utrecht.
25. Oehrle, Richard T., Emmon Bach, and Deirdre Wheeler, 1988, (eds.), *Categorial Grammar and Natural Language Structures*, D. Reidel, Dordrecht.
26. Pollard, Carl, and Ivan A. Sag. 1994. *Head-driven phrase structure grammar.* Chicago: University of Chicago Press.
27. Prince, Alan, and Paul Smolensky, 2004, *Optimality Theory: Constraint Interaction in Generative Grammar*. Blackwell, Oxford.
28. Pullum, G. K. and Zwicky, A. M. 1986. 'Phonological resolution of syntactic feature conflict.' *Language*, 62(4): 751–773.
29. Sag, Ivan, Gerald Gazdar, Thomas Wasow and Steven Weisler, 1985. 'Coordination and how to distinguish categories.' *Natural Language and Linguistic Theory*, vol. 3, 117-171.
30. Solias, M. Teresa. 1991. 'The category of the conjunction in categorial grammar.' *Catalan Working Papers in Linguistics*, 301-341
31. Steedman, Mark J. 1985, 'Dependency and Coordination in the Grammar of Dutch and English,' *Language* 61-3, 523-568.
32. Steedman, Mark J. 1990. 'Gapping as Constituent Coordination,' *Linguistics and Philosophy*, 13, 207-264.
33. Steedman, Mark J. 2000. *The Syntactic Process.* MIT-Press, Cambridge, MA.
34. Whitman, Neal. 2002. *Category neutrality : a type-logical investigation.* Ph.D. dissertation, The Ohio State University.
35. Whitman, Neal. 2009. 'Right-node wrapping: Multimodal categorial grammar and the 'Friends in Low Places' Coordination.' In: Erhard Hinrichs and John Nerbonne, eds., *Theory and Evidence in Semantics.* CSLI, Stanford, 235-256.
36. Williams, Edwin. 1982. 'Another argument that passive is transformational.' *Linguistic Inquiry* 13, 160–163.
37. Zwarts, Frans. 1986. *Categoriale grammatica en algebraïsche semantiek: een onderzoek naar negatie en polariteit in het Nederlands*. Dissertation, Rijksuniversiteit Groningen.